APPARATUS FOR HEATING FLUIDS

BACKGROUND OF THE INVENTION

The present invention relates to devices containing rotating members for heating fluids.

Various designs exist for devices which use rotors or other rotating members to increase pressure and/or temperature of fluids (including, where desired to convert fluids from the liquidous to gaseous phases). U.S. Pat. No. 3,791,349 issued Feb. 12, 1974 to Schaefer, for instance, discloses an apparatus and method for production of steam and pressure by intentional creation of shock waves in a distended body of water. Various passageways and chambers are employed to create a tortuous path for the fluid and to maximize the water hammer effect.

Other devices which employ rotating members to heat fluids are disclosed in U.S. Pat. No. 3,720,372 issued Mar. 13, 1973 to Jacobs which discloses a turbing type coolant pump driven by an automobile engine to warm engine coolant; U.S. Pat. No. 2,991,764 issued Jul. 11, 1961 which discloses a fluid agitation-type heater; and U.S. Pat. No. 1,758,207 issued May 13, 1930 to Walker which discloses a hydraulic heat generating system that includes a heat generator formed of a vaned rotor and stator acting in concert to heat fluids as they move relative to one another.

These devices employ structurally complex rotors and stators which include vanes or passages for fluid flow, thus resulting in structural complexity, increased manufacturing costs, and increased likelihood of structural failure and consequent higher maintenance costs and reduced reliability.

SUMMARY OF THE INVENTION

Devices according to the present invention for heating fluids contain a cylindrical rotor whose cylindrical surface features a number of irregularities or bores. The rotor rotates within a housing whose interior surface conforms closely to the cylindrical and end surfaces of the rotor. A bearing plate, which serves to mount bearings and seals for the shaft and rotor, abuts each side of the housing. The bearing plates feature hollowed portions which communicate with the void between the housing and rotor. Inlet ports ar formed in the bearing plates to allow fluid to enter the rotor/housing void in the vicinity of the shaft. The housing features one or more exit ports through which fluid at elevated pressure and/or temperature exits the apparatus. The shaft may be driven by electric motor or other motive means, and may be driven directly, geared, powered by pulley or otherwise driven.

According to one aspect of the invention, the rotor devices may be utilized to supply heated water to heat exchangers in HVAC systems and to deenergized hot water heaters in homes, thereby supplanting the requirement for energy input into the hot water heaters and furnace side of the HVAC systems.

It is accordingly a object of the present invention to provide a device for heating fluid in a void located between a rotating rotor and stationary housing, which device is structurally simple and requires reduced manufacturing and maintenance costs.

It is an additional object of the present invention to produce a mechanically elegant and thermodynamically highly efficient means for increasing pressure and/or temperature of fluids such as water (including, where desired, converting fluid from liquid to gas phase).

It is an additional object of the present invention to provide a system for providing heat and hot water to residences and commercial space using devices featuring mechanically driven rotors for heating water.

Other objects, features and advantages of the present invention will become apparent with reference to the remainder of this document.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partially cutaway perspective view of a first embodiment of a device according to the present invention.

FIG. **2** is a cross-sectional view of a second embodiment of a device according to the present invention.

FIG. **3** is a cross-sectional view of a device according to a third embodiment of the present invention.

FIG. **4** is a schematic view of a residential heating system according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

As shown in FIG. **1**, device **10** in briefest terms includes a rotor **12** mounted on a shaft **14**, which rotor **12** and shaft **14** rotate within a housing **16**. Shaft **14** in the embodiment shown in FIGS. **1** and **2** has a primary diameter of 1¾" and may be formed of forged steel, cast or ductile iron, or other materials as desired. Shaft **14** may be driven by an electric motor or other motive means, and may be driven directly, geared, driven by pulley, or driven as otherwise desired.

Attached rigidly to shaft **14** is rotor **12**. Rotor **12** may be formed of aluminum, steel, iron or other metal or alloy as appropriate. Rotor **12** is essentially a solid cylinder of material featuring a shaft bore **18** to receive shaft **14**, and a number of irregularities **20** in its cylindrical surface. In the embodiment shown in FIGS. **1** and **2**, rotor **12** is six inches in diameter and nine inches in length, while in the embodiment shown in FIG. **3** the rotor is ten inches in diameter and four inches in length. Locking pins set screws or other fasteners **22** may be used to fix rotor **12** with respect to shaft **14**. In the embodiment shown in FIG. **1**, rotor **12** features a plurality of regularly spaced and aligned bores **24** drilled, bored, or otherwise formed in its cylindrical surface **26**. Bores **24** may feature countersunk bottoms, as shown in FIG. **2**. Bores **24** may also be offset from the radial direction either in a direction to face toward or away from the direction of rotation of rotor **12**. In one embodiment of the invention, bores **24** are offset substantially 15 degrees from direction of rotation of rotor **12**. Each bore **24** may feature a lip **28** (not shown) where it meets surface **26** of rotor **12**, and the lip **28** may be flared or otherwise contoured to form a continuous surface between the surfaces of bores **28** and cylindrical surface **26** of rotor **12**. Such flared surfaces are useful for providing areas in which vacuum may be developed as rotor **12** rotates with respect to housing **16**. The depth, diameter and orientation of bores **24** may be adjusted in dimension to optimize efficiency and effectiveness of device **10** for heating various fluids, and to optimize operation, efficiency, and effectiveness of device **10** with respect to particular fluid temperatures, pressures and flow rates, as they relate to rotational speed of rotor **12**. In a preferred embodiment of the device, the bores